US007075661B2

(12) **United States Patent**
Petty et al.

(10) **Patent No.: US 7,075,661 B2**
(45) **Date of Patent: Jul. 11, 2006**

(54) **APPARATUS AND METHOD FOR OBTAINING THREE-DIMENSIONAL POSITIONAL DATA FROM A TWO-DIMENSIONAL CAPTURED IMAGE**

(75) Inventors: **John Michael Petty**, Sheffield (GB); **Phillip Stephen Petty**, Sheffield (GB)

(73) Assignee: **Industrial Control Systems Limited**, Sheffield (GB)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 113 days.

(21) Appl. No.: **10/468,953**

(22) PCT Filed: **Feb. 22, 2002**

(86) PCT No.: **PCT/GB02/00738**

§ 371 (c)(1),
(2), (4) Date: **Aug. 22, 2003**

(87) PCT Pub. No.: **WO02/068987**

PCT Pub. Date: **Sep. 6, 2002**

(65) **Prior Publication Data**

US 2004/0128102 A1 Jul. 1, 2004

(51) **Int. Cl.**
G01B 11/24 (2006.01)
G06K 9/00 (2006.01)
G03B 13/00 (2006.01)

(52) **U.S. Cl.** **356/603**; 356/604; 356/610; 356/616; 356/620; 382/111; 396/106; 396/431; 396/50

(58) **Field of Classification Search** 356/600–625; 250/559.22, 559.05; 382/111, 321, 779; 396/106, 431, 50; 438/774, 761, 766, 239, 438/207.09
See application file for complete search history.

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Primary Examiner—Gregory J. Toatley, Jr.
Assistant Examiner—Sang H. Nguyen
(74) *Attorney, Agent, or Firm*—Harness, Dickey & Pierce, P.L.L.C.

(57) **ABSTRACT**

Methods and apparatus for introducing a plurality of optical markers to a field of view, capturing a two-dimensional image of said field of view on an image plate comprising a pixel array, determining a set of marker origin offset values and using said offset values to establish a set of orientation values describing the relationship between the field of view and the image plate are disclosed. These orientation values are used to relate the area of image captured by each pixel in the image plate to the real world. By applying projective geometry, vector analysis and trigonometrical surveys an image analysis is conducted to establish a three-dimensional positional data set describing the three-dimensional position of regions of reflectivity in the captured two-dimensional image. From this data set a three-dimensional model of the field of view can be reconstructed.

42 Claims, 28 Drawing Sheets